

***Demographic bonuses and challenges of the Age structural transition in
Brazil***

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Demographic bonuses and challenges of the Age structural transition in Brazil

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ABSTRACT ¹

The Brazilian Age Structural Transition (AST) produced primarily by dramatic fertility decline is analyzed. Slightly ahead of most of the Latin American countries, Brazil entered into the stage in which some of the strongest, mostly positive, AST effects are to be perceived. Some improvements related to health and education among children and youngsters, for example, were achieved partly due to the AST. Among the working age population the *mature* population (age 25-64) that usually has high activity rates and is constituted by important taxpayers, will increase in relative and absolute terms at least until 2045. The *junior* segment (age 15-24) - a proxy of those entering for the first time into the labor force-, in contrast, will probably have negative growth rates. Thus, the ratio of the junior labor force to the mature labor force, an indicator of the pressure for new employments, has a downwards trend in the five socio-geographic Brazilian regions. Different growth rates inside the working-age population are therefore another demographic window of opportunities. This bonus however, can only be claimed if full employment and higher productivity are pursued. As a necessary although not sufficient condition to achieve social, economic and intergenerational balance, labor force skills should be at their higher levels. On the other hand, due to the AST, new challenges emerge in Brazil. Population aged 65 or more will necessarily expand in relative and absolute terms. If current per capita government transferences remain constant, the difference between age-related government expenditures and revenues would cause unbearable increment in the fiscal deficit. Prospectively, any simulation about age-related government expenditures will result in the already known scenario: the elderly will demand massive resources, due to social security plans and because it is just at older ages that health care is more necessary and expensive. The foretold fiscal crises caused by the aging of the population combined with an unsound Brazilian Social Security System should be a matter of concern for the Brazilian society.

Most of the policy recommendations to developed countries made decades ago regarding the AST are similar to those discussed in this paper; what is different, however, is the speed of present changes in several developing countries. It is extremely important in order to take advantage of the demographic bonuses and to prepare to society to face the new challenges to be aware of the short period to define, implement and accomplish plans, whatever they may be.

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Introductory note

This paper focuses in the Age Structural Transition² and the demographic advantages and challenges that this process brings about in Brazil, a country that, having 180 million inhabitants in 2005, represents about 30 % of the total population in Latin America.³ The process primarily caused by dramatic fertility changes is well advanced in all regions inside the country; they are simultaneous shifts that have occurred in a regional context holding same history and culture –where the Portuguese language is almost universal– and extreme socioeconomic and geographical inequalities.

Most of the data used in the paper are forecasts that rely on the accomplishment of certain assumptions that, we believe left small room for significant changes in the projections. *Ceteris paribus*, fertility will not return to previous levels; indeed, recent revisions have shown that fertility levels have frequently been over-estimated. It can be assumed that mortality rates, despite the paucity of reliable data on adult mortality, will continue to decrease unless there is an upsurge in devastating diseases. Finally, international migration may lead a need to modify the forecasts, but even in this case, this would not cause dramatic changes in the projections for the following one or two decades.

The paper describes, firstly, the demographic transition that Brazil is undergoing; secondly, using secondary data, some perspectives of the probable government expenditures given the future age pattern are presented. Lastly, social demands of the different age groups, the challenges that the AST poses and alternatives to face those challenges are considered.

1 - The age structural transition in Brazil

Between the 1940's and the 1960's, a major part of Latin America's population experienced a significant decline in mortality, whereas fertility was relatively constant. This resulted in a quasi-stable population. Following this, however, the onset of the fertility decline initiated a deep change in the age distribution that will produce deep structures changes, similar to those of some highly populated Asian developing countries that also have gone through impressive demographic changes.

This change in the case of Latin America and the Caribbean (LAC) may be seen through variations in the median age (M)⁴. It increased in LAC about 6 years between 1965 – when emerging demographic changes were still not yet reflected in the age structure– and 2000. In fact, the Brazilian median age (25.4 in 2000) increased by more than 7 years during the period 1965-2000; during the same 35-year

² The term *Age Structural Transition* (AST), defined primarily by Pool (2000), encompasses the changes produced primarily by fertility decline and thus in the sizes of birth cohorts. They are then mediated by shifts in survivorship patterns, and in many populations by migration flows.

³ This country is also considered because of its geo-political importance: the Brazilian territory has about 8,5 million Km² (nearly 90% of the USA surface). While part of the North and Northeast areas are located above the Equator, important share of the Southern territory is located well below the Tropic of Capricorn.

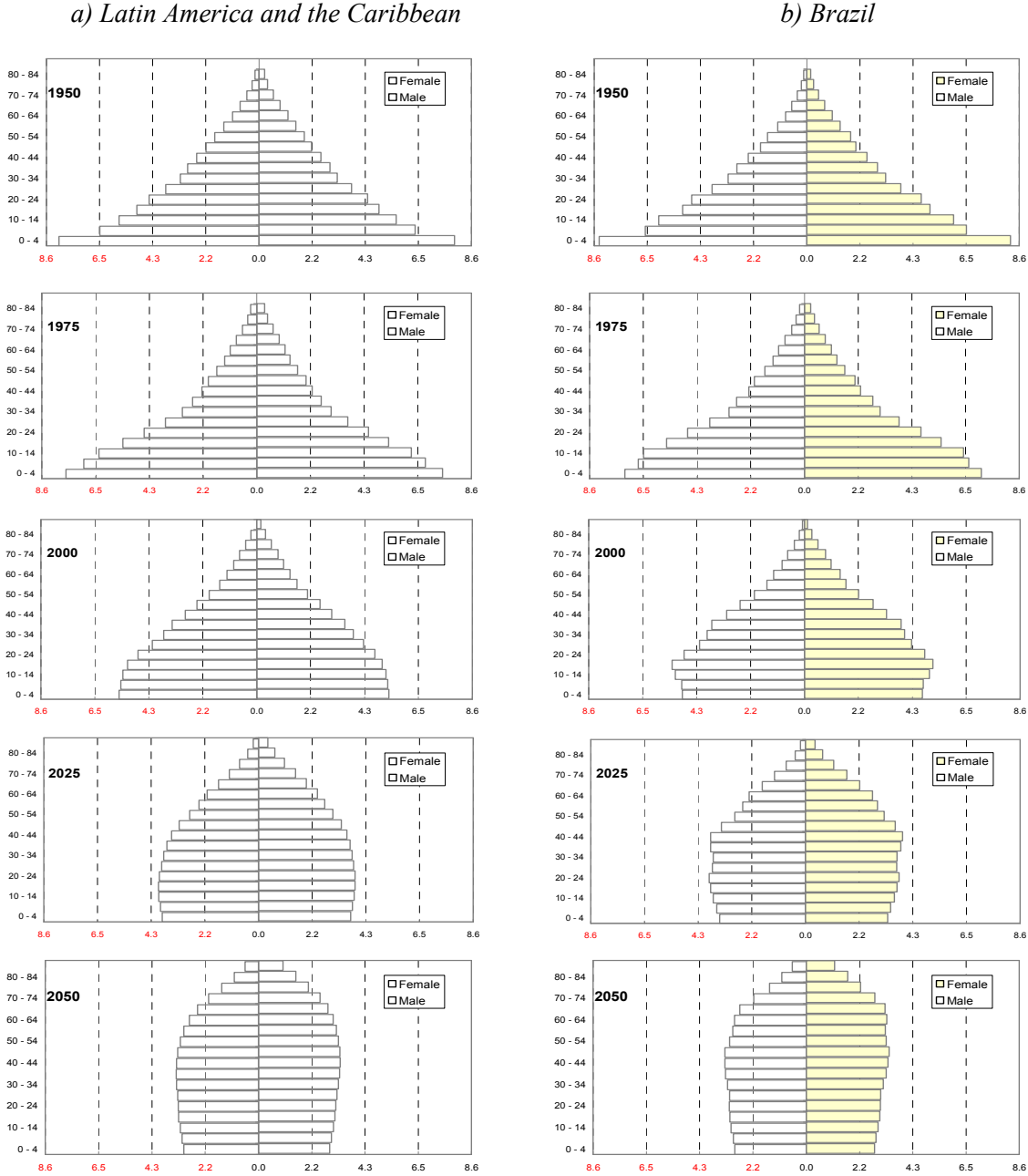
⁴ Increase in the Median age (M) of the total population according to United Nation (2003) are as follows:

Region	Increases in M (in years)			M (2050)
	1965-2000	2000-2050	Total increment	
Europe	6.8	10.0	16.8	47.7
Latin America & the Caribbean	5.6	15.5	21.1	39.8
Brazil	7.2	15.8	23.1	41.2

Source: Raw data from United Nations, 2003

period, European countries also aged, albeit at slower pace. Besides, by 2050, the Brazilian age pattern (with $M=41.2$) will be older than the current average in Europe ($M=37.7$ in 2000).

Figure 1. Latin America and Brazil, 1950-2050: Population by age and sex (relative distributions)



Source: Raw data from United Nations, 2003.

Brazil has experienced an even faster age structural change than the entire LAC, as shown by the evolution of the pyramids in Figure 1, and this difference with the rest of LAC will probably be wider over the next decades.

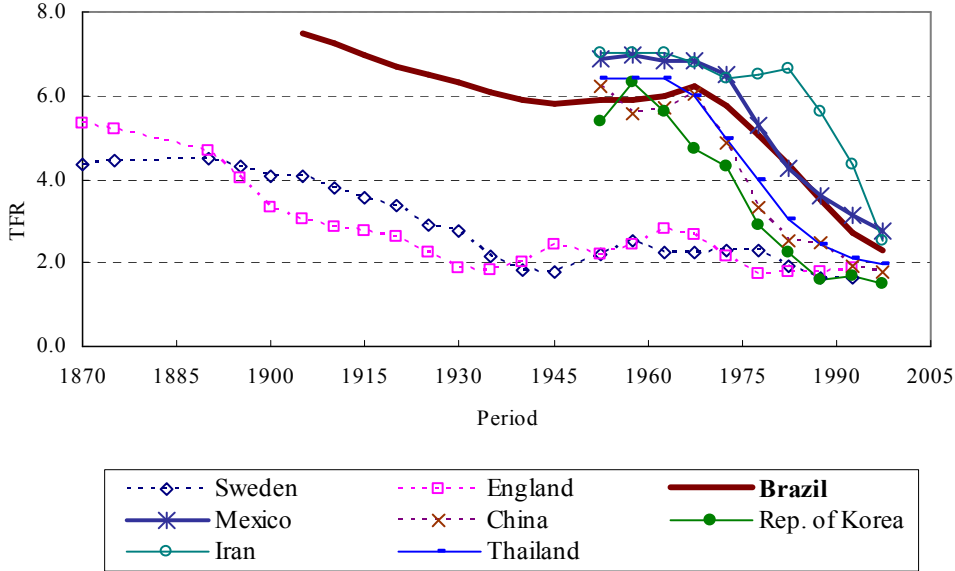
Brazil's demographic change has been caused by a particular combination of trends in fertility and mortality. That said, the influence of the former is the more important.

The onset of the Brazilian Fertility transition had taken place by the end of the sixties. The Total Fertility Rate (TFR) dropped from 6.2 to 2.7 children per woman over the period 1965-1990. Figure 2 shows this fast decline, equivalent to 56% in 25 years. Although extreme socio-economic and geographic inequalities delayed the onset in the less privileged regions of the country, estimates using data from the 2000 demographic census indicate that replacement has almost been reached in most of the territory. The Northeast Brazilian Region, that has around 50 million people, approximately 30% of the Brazilian population, and traditionally bears the less favorable socio-economic conditions, had a 50% reduction in the TFR in a 15 year period (from 6.1 in 1980 to 3.0 in 1995). Similar speed reduction was observed in the North Region. These two least developed and poorest Brazilian regions experienced a more intense fertility decline than the South East Region (Wong, 2000).

In short, the rate of fertility decline has been even faster in the less developed regions and the national TFR is currently around 2.2.

The magnitude of the general decline of fertility in Brazil over such a short period of time is, on the one hand, surprising when compared with the experience of developed nations. It is known that most European countries took about a century to complete their fertility transition, and countries like Sweden and England, for instance, took about six decades (approximately from 1870 to 1930) to bring down their levels by about 50%. Brazil, instead, experienced a similar decline in just a quarter of century. On the other hand, this speedy decline is by no means unique to Brazil. (See Figure 2).

Figure 2. Sweden, England, Brazil and selected developing countries: Total Fertility Rate for selected periods.



Source: Carvalho and Wong, (1998) and United Nations, 2003.

Countries with different cultures and socio-political organization and, above all, with different population policies and family planning programs (ranking from compulsory regulation to no policy at

all, which was the Brazilian case) have experienced similar changes in their fertility levels over approximately the same durations. Some examples are Thailand, South Korea, Iran, China and Mexico.

Prospectively, there are no signs of recovery for Brazil, and, according to United Nations estimates, it will correspond to Brazil having the lowest South American level for the period 2000-2025 (United Nations, 2003). Furthermore, cohort-estimates suggest that, by 2005, the TFR might be definitively at replacement level. Beyond this, there are no indications that fertility will stabilize around 2.0 children per woman, and thus fertility might continue to decrease to well below replacement (Perpetuo and Wong, 2003).

Mortality also showed a sustained downward trend that started in the better off regions during the late thirties but sped up during the sixties (Camargo and Frias, 2001), also affecting the age structure. Children born during the fifties were expected to have less than an 80% chance of surviving up to age 15, while for the cohorts born at the beginning of the current century this probability rose to 95%. Impressive changes are noticed at adult ages; only half of the cohorts born during the fifties were expected to survive to retirement ages. In contrast, according to more recent life tables (Sawyer et al. 1999), about 80% of those born after the year 2000 are expected to reach old age.

International migration has had little impact on the age structure over recent decades; internal migration, in contrast, plays an important role in explaining regional age structural changes. Intense internal flows at labor force ages (which means sex and age selectivity) to the richer Brazilian southern areas contribute to exacerbate the aging process in the sending areas. Areas where the onset of fertility transition took longer, were, at the same time, the most important providers of working-age populations towards areas where the transition was already underway. As a consequence, a number of relatively poor States, in spite of more recent fertility declines, ended up with the older age structures. In addition, there were new internal migration flows oriented towards medium size cities that had commenced before the dawn of the new century. These new flows will probably accelerate because the absorptive capacity of the traditional destinations that are now *megalopoli* has been exhausted. It is important to note that this emerging pattern will probably have different impacts on the age structure of the sending and receiving regions. It will also have important consequences for changes in socio-economic demands to be met by national policies.

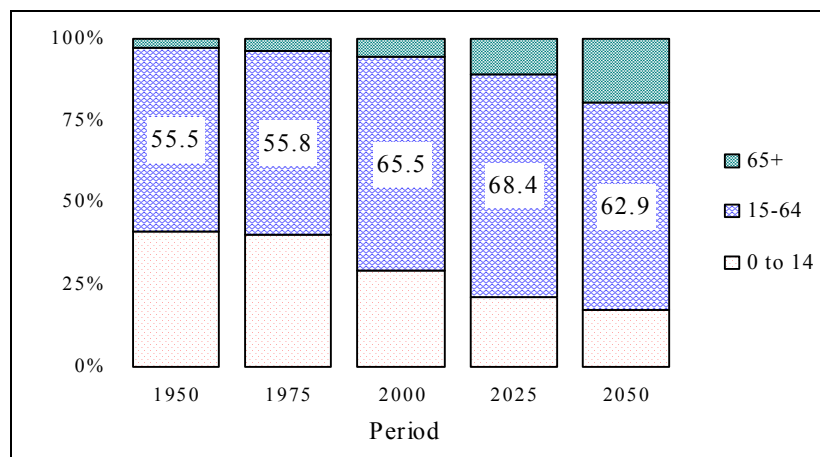
1.1 The age structure

A combination of changing trends in fertility and mortality affected the quasi-stable population structure that Brazil experienced until the seventies. Thus mainly as a consequence of fertility decline, the share of children under age five years dropped from 15% to 11% between 1970 and 1990. Similarly, age group 5-9 years saw its share drop from 14% to 12%. Proportions at these ages continued to drop until 2000, when, besides a decrease, the sizes of both age groups became very similar (each of them sharing about 9% of the total population). Thus the age structure started to get rid of its pyramidal look alike, and a rectangular shape emerged as an additional indication of the aging process (Figure 1). Complementarily, older age groups increased their share. The population aged 60 years or more, for example, increased from 5.1% in 1970, to 8.6% in 2000.

The inter-age relationships

An analysis of simple indicators measuring the share of the total found in three large age groups (less than 15, 15 to 64 and 65 or more), the Dependence Ratio (DR) and the Aging Index constitute a first approach to the study of inter-age relationships seen while the country is undergoing an AST. Figure 3 shows that the population distribution is changing mainly because of the shifts in shares at the extremes.

Figure 3. Brazil, 1950-2050: Age distribution of the population (three large groups)



Source: Raw data from Unites Nations, 2003.

Data in Table 1 emphasize the findings reported above. The dependency ratio (DR) and its components (Children, CDR, and Elderly, EDR) define more clearly the relationship between the different age groups. The burden on the productive population (aged 15-64 years) had remained constant –and at extremely high values– until about the seventies when the dependent population (under age 15 and over 65) in Brazil, were nearly half of the total population and more than 90% of them were children below age 15. The DR has been decreasing since then and in the population projections will continue to decrease until 2025. This downward tendency is a blend of two opposed trends: an increase in the absolute size of the older adult population and a decrease followed by stabilization of the population below age 15. Carvalho and Wong (1998) remind us that the total DR will not recover the high levels it had at the beginning of the 20th century, although the EDR will increase twofold over the period 2000-2025 (or fourfold, if the period 2000-2050 is considered). Also, the Potential Support Ratio (an index of relating to those potentially able to support elderly people and calculated as the inverse of the EDR) will experience a sharp decrease after 2000, which is explained by a rate of increase in the size of the population aged 65 or more that surpasses the growth of the economically active age population. Finally the Aging Index, a measure that is more sensitive to variations in the age distribution since it only considers the two age groups that are affected in the aging process, shows the velocity of the aging process. Comparisons made by Moreira (1997) locate Brazil among those countries with the most acute increases of this Index in the near future. Over a 25-year period the Aging Index will increase threefold over the ratio seen in 2000, to reach a level where there would be more than 50 adults aged 65 or more per 100 children below age 15. Before the end of the projection period, by 2045, the number of elder people would surpass the number of children.

Table 1
Brazil, 1950-2050: Dependency Ratios and their relative distribution and Aging Indexes

Period	Dependency						Potential support Ratio (4)	Aging Index (per cent) (5)
	Ratio (per cent)			Relative distribution				
	Total (1)	Children (2)	Elderly (3)	Total	Young	Elderly		
1950	80.3	74.9	5.4	100.0	93.3	6.7	18.6	7.2
1975	79.2	72.2	7.0	100.0	91.2	8.8	14.4	9.6
2000	52.7	44.8	7.9	100.0	85.0	15.0	12.7	17.6
2025	46.2	30.6	15.6	100.0	66.2	33.8	6.4	51.0
2050	59.1	27.6	31.5	100.0	46.7	53.3	3.2	114.3

(1) Dependency Ratio (TDR) = CDR + EDR.

(2) Children Dependency Ratio (CDR) = Pop. less than 15/population aged 15-64.

(3) Elderly Dependency Ratio (EDR) = Pop. aged 65 or more/population aged 15-64.

(4) Number of persons aged 15-64 per persons aged 65 or more.

(5) Aging Index = (Pop. aged 65 years or more / Pop. less than 15)

Source: Raw data from United Nations, 2003

Currently, if one considers the relationships between the three broad age groups, Brazil is benefiting from a demographic bonus. The country is achieving its lowest DR over the century 1950-2050, due to the expansion of the population at working ages (in absolute and relative terms), to a rapid decrease of the childhood share, and the relatively low growth rate as yet of the elderly population. According to Carvalho and Wong (1998), this structural situation is encouraging in two ways. Firstly, in the short to medium term the small size of the current generations at childhood ages pushes down the DR, making it possible to re-orientate the direction of available resources from factors of quantity to those of quality. In addition, one might expect an increase in the per capita government expenditure on primary education when the negative growth in the number of youngsters stays for a long while. At the same time, the large proportions at working ages produce low dependency ratios either from child or elderly populations will reduce pressures on the current social welfare system, at least until the EDR enters the phase of fast growth. Slightly ahead of most of the Latin America countries, Brazil has entered into a the stage during which, according to Behrman et al, (2001), some of the strongest (mostly positive) age structural effects will be observed . This situation, certainly provides favorable conditions of the society to re-formulate its social security scheme and determine an ideal retirement strategy. Secondly, the elderly dependency ratio will be significantly high only from 2020. The children of today, who belong to smaller generations than those generations before them, will be the labor force of tomorrow, the cohorts, who, in turn, will have to face growing elderly dependency ratios. The logical conclusion to all this, is that the society vitally needs to invest in the current generation of children, particularly in areas of health and education. This is not only a matter of quality of life, but also because they (again, a part of smaller generations) will be needed to sustain the economy and to care for a rapidly increasing proportion at older ages.

The growth rates

The picture of the AST given by considering the three largest age groups can be better understood by studying trends in the annual average growth rate (r) for different narrower age groups (See Table 2). Populations in groups 0-14 and 15-24 years, born after 1975 and, therefore, during the period of fertility decline, will grow during the first half of this century at rates well below the average value for

the total population, and, except for the age group 15-24 between 2000/05, their growth rates will be negative until the population becomes stable.

Table 2 - Brazil, 2000/2050: Annual average growth rate: Total population and selected age groups

Period	Total	0-14	15-24	25-64	65-74	75 +
2000-2005	1.2	-0.32	0.38	2.26	3.04	4.84
2010-2015	0.9	-0.26	-0.65	1.60	3.68	4.27
2020-2025	0.6	-0.75	-0.06	0.73	3.86	4.50
2030-2035	0.4	-0.41	-0.73	0.38	1.90	4.46
2045-2050	0.1	-0.52	-0.22	-0.42	2.14	2.27

Source: Raw data from United Nations, 2003.

At the beginning of this present century, the population below age 15 years is experiencing negative growth. Those at ages at which further education occurs or start entering the labor force (at ages, say, 15-24 years), although still increasing, have growth rates below 0.5% and this will turn to negative growth over the next four decades. Those age-groups at which participation in the labor force is centered (ages 25 to 64) are now expanding at growth rates over 2% and will continue to expand, but at decelerating rates. The size of population aged 25-65 (the bulk of the employed labor force) will stop increasing only from 2045. Finally, groups over age 65 grow at positive and high rates during the whole period. It is this pattern of differentiated values for the function r (lower for the young population, higher for the working age population until 2025, higher for the older population) that necessarily produces a change in the age structure.

1.2. The size of the Brazilian population

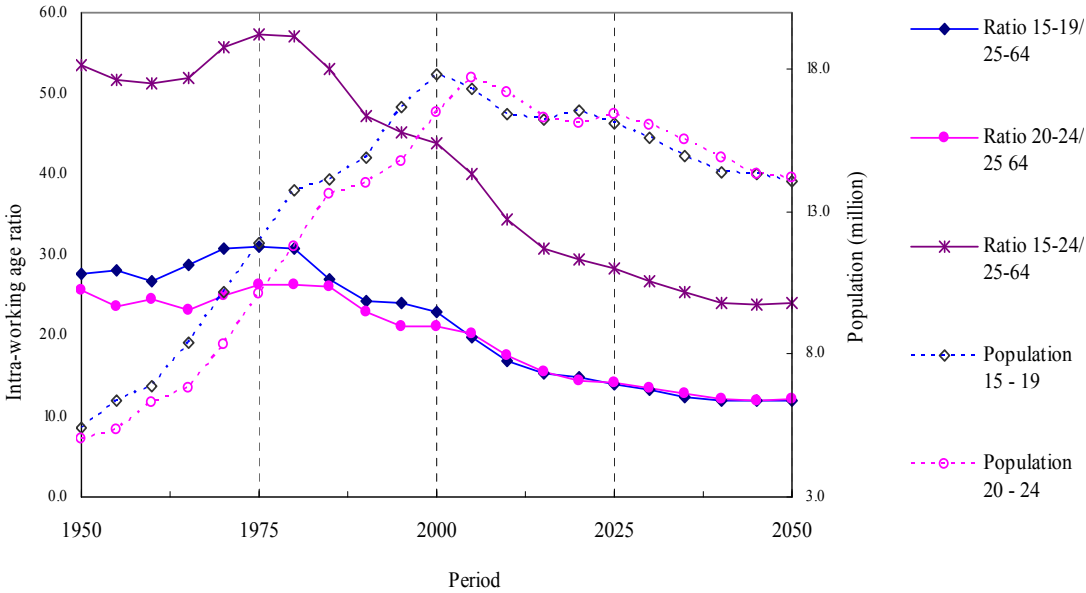
The consequences of different growth rates on the absolute sizes of the different age groups, is also an important issue to consider because, undoubtedly, the Brazilian population will continue to grow, despite the current fertility changes towards, as has been noted, below replacement level fertility and negative growth rates at younger ages during the transitional period.

Between 2000 and 2020, 38 million people will probably be added to the total population, yet for youngsters childhood, and even for parts of the adult population negative growth rates will prevail. During this period, the size of the population under age 30 years born after the onset of fertility decline, would shrink by 3.4 million. Because of the waves, some younger age groups will show higher losses. For example, the size of the population under age 25 years will drop by 5 million⁵. Furthermore, the age group 15-35 (that includes women responsible for more than 90 % of the current births), will face negative growth for the whole period 2010-2050; accordingly, the number of births will decline, even through fertility rate remained constant.

⁵ Between 2020 and 2040, the population size at this age will gain 20 million more people, yet notwithstanding this positive contribution will correspond in size only to the population aged 60 years or more. Below that age, each population is reducing in size.

Finally, it is important to consider the inner composition within the economically active age population (See figure 4)

Figure 4. Brazil, 1950-2050: Population aged 15-19 and 20-24 and three intra working age ratios (15-19/25-65; 20-24/25-65 and 15-24/24-65).



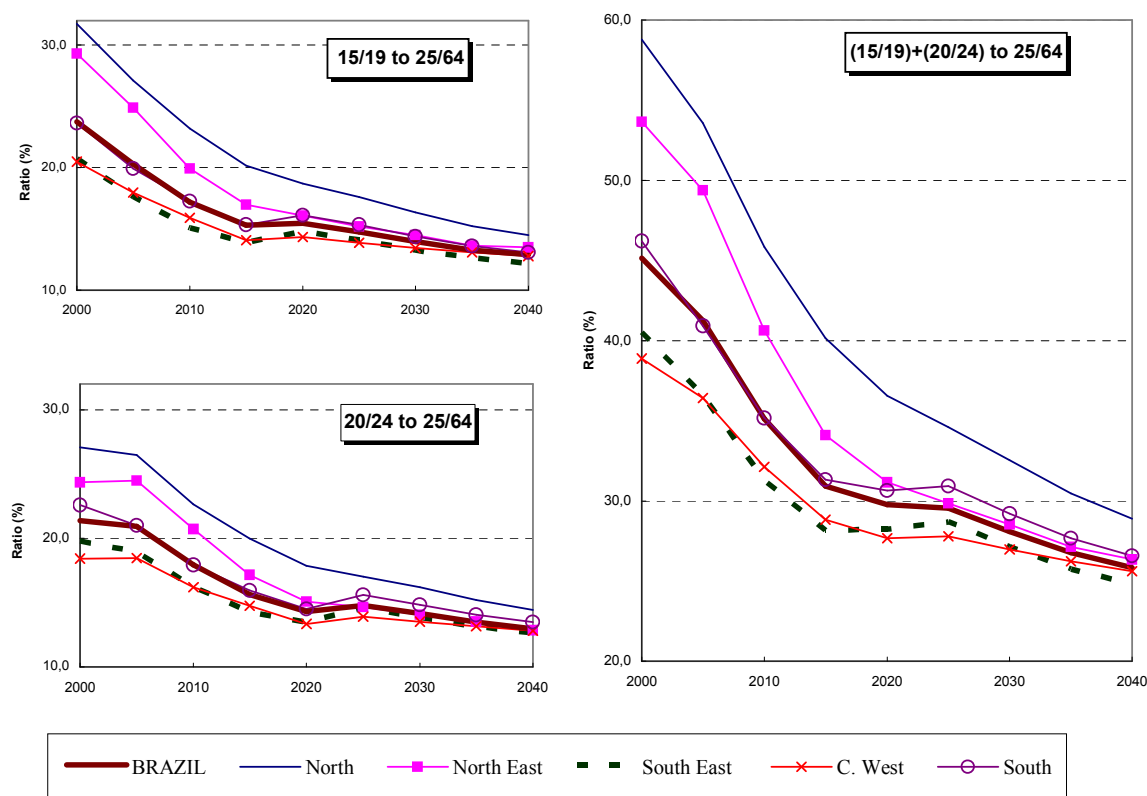
Source: Raw data from United Nations, 2003.

Firstly, the *mature* working age population (ages 25 to 64 years: 75.5 million people in 2000). Its high growth rate implies an annual increment of between 2 and 1.5 million people over the first decade of this century. This important sub-group, representing nearly half of the total population, would continue to increase at least until 2045. Secondly, there is the *junior* segment of the economically active population (ages 15 to 24: 34.3 million people in 2000). This age groups is a proxy for those entering into the labor force for the first time, but after 2005, will probably have negative growth rates. An important fraction (those aged 15-19 years) will usually be obtaining qualifications, and the other also important fraction (20-24), although economically active will probably be looking for their first job. The *mature* age group (25-64), in contrast, usually has higher activity rates and is composed of the most important taxpayers in the whole ‘active age’ range.

When the working age population is relatively young, unemployment tends to be higher and tends to lessens as the age structure shift towards older ages (Behrman et al. 2001). The size of the junior group has increased in absolute numbers very rapidly until recently in Brazil (See Figure 4, left axis). Demographically speaking, by entering into the labor force they pressured the economy towards the creation of enough employment so as to avoid social or economic instability due to increasing

unemployment, or because they take jobs from older people still at working ages ⁶. The ratio of the junior to the mature labor force is an indicator of the pressure for the need to generate employment. In the case of Brazil, the ratio has been downwards since the mid seventies (Figure 4). After 2000, there will be an acceleration of this trend due to the negative r of the young population. Due to the widespread AST throughout the country the same trend is observed all over the socio-geographic Brazilian regions regardless of their economic development (See Figure 5). Currently, all regions have accentuated decline trend in this ratio and indeed, the “late comers” to the AST, North and North East regions - that, as said, are less developed - are also expected to have the more accentuated decline in these ratios. The more privileged regions and with more advanced AST will tend to stabilize the ratio in about 10/15 years time.

Figure 5: Brazil and Regions: 2000 - 2040: Intra working age ratios (per cent)



Source: Estimates generated using Forecasts by Sawyer et al. (1999)

Although the demographic transition from a young to an older population initially can boost the prospects for economic growth due to the reduction in the young dependency ratio, the shift to larger proportions of the population at working ages can also constitute a potential threat if the right policies are not in place (Behrman et al.; 2001). On the one side, if, however, during the AST, the growth rates

⁶ Muniz (2003) has found this relationship, particularly among young men (15-19) in the Brazilian metropolitan areas, where even higher growth rates for these age groups are caused by internal migration. This demographic trend is probably one of the factors that made harder to solve unemployment problem in the nineties.

of the economic active population are differentiated by age, as in the Brazilian case, there might be other window of opportunities. This time, within the labor force age range, where a positive r corresponds to the age group that includes mature workers, who, in turn, usually achieve higher employment rates than do junior workers⁷. On the other side, the challenge will be harder to cope with if mature labor force is unskilled and adequate social planning is absent, which is the case in the less developed Brazilian regions. The demographic bonus brought about by the ratio mentioned above, indicating less pressure for new jobs will be worthless.

2 - Some economic consequences of the AST in Brazil.

Irrespective of the demographic bonus brought about by ASTs in Latin America, the economy is experiencing continuous hard times. Social and economic programs being implemented by the Government face chronic levels of domestic and international debt, and most of the funding relies on the perceptions of international investors about the state of the national economy.

In spite of positive performance of social indicators during most of the second half of last century, Brazil is still underdeveloped and has one of the world's worst income distributions socially and geographically, as illustrated in the Map presented in Annex 1. Public social policies have to play a significant role to overcome such disparities. But most of the social policies are age-related and will need to take into account the ongoing AST. On the one hand, programs dedicated to children or reproductive health, for example, could be qualitatively improved because the number of beneficiaries is lessening (in relative and very often in absolute terms). On the other hand, more pressure will come from new needs. The demands, for instance, of the older population might become so unbearable that resources from other programs might need to be re-allocated to this population segment.

To evaluate the magnitude of the forthcoming changes, an analysis of age-related expenditures made by the government is presented.

2.1 About the government age-related revenues and expenditures

An accounting exercise of government tax transfers (revenues and expenditures) by age in the 1990s (Turra, 2001) reveals as might be expected, that flows for funding public expenses are more important at the central ages of the economically active population. The tax age profile estimated by that author shows that transfers from the population aged 30-49 years were about US\$ 2,000 per capita per annum in 1996, with ages 40-49 being the modal point (See Figure 6) 8.

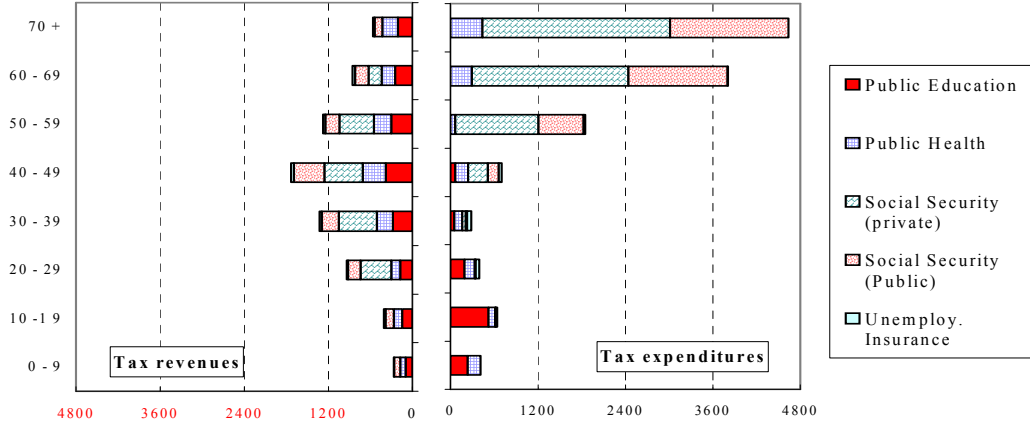
Government age-related expenditures as estimated by Turra (2001) were higher than age related revenues and had different age patterns. Lower volumes are assigned to young people, and most of the revenues are allocated to education, which is the case of age group 10-19. The lowest per capita expenditure goes to age group 30-39 years. After that age, government transfers increase

⁷ Findings by Behrman et al. (2001) show that if the age structure of the population is relatively young, the growth rate of the working age population tends to outpace the growth rate of capital accumulation. Afterwards, when the younger cohorts reaching working age are smaller, capital per worker tends to increase.

⁸ Accounting by Turra (2000) shows that total aged and non-aged-related governmental taxes revenues summed US\$ 218 billion, equivalent to 28% of the GNP for 1996. Figures presented here do not consider non-age related items, such as public safety, transportation, research, and defense

exponentially. Transfers at older ages go almost exclusively to public health, pensions and retirement. After age 60, expenditure is higher than US\$ 4,000 per annum/ per capita which is about tenfold the equivalent transferred to a child below age 10. Resources allocated to the elderly Brazilian population are relatively high, and according to Turra (2001) the proportions are similar to those found in developed countries. Most of the resources go to social security due to a quite generous policy for retirees in general, and for civil service retirees in particular. A relatively small fraction goes to public health. Brazil certainly differs significantly from the majority of developed countries in this aspect.

Figure 6. Government transfers by age groups - Annual values per capita- US\$ (circa 1995).



Source: Elaborated from data by Turra (2001).

Given the age-structure of the per capita government transfers, there has been according to Turra significant economic gain due to demographic bonuses (the relatively high growth rate of the labor force being one of them). However the demographic windows of opportunities will not last forever while there are emerging challenges that affect social phenomena that are intrinsically embedded in the new demographic patterns.

2.2 Projection of age-related government revenues and expenditures

The future government transfers (expenditures) will probably increase proportionally more than the revenues (from the taxpayers) due to the progress of the AST. A simple simulation of the transfers was made using data produced by Turra (2001). Global results are in Table 3 and figures disaggregated by age groups were plotted in Figure 7.

The exercise is done for the years 2000, 2025 and 2050 under the assumption that per capita transfers (revenues and expenditures) remain constant by age. In a broad sense, this implies constant individual tax transfers to the government and constant values for the per capita supply of basic public services such as health, education and social insurance. It would be possible to use more complex hypothesis for forecasting public revenues and expenditures that are age-related. However the constant per capita value is assumed here, because the emphasis is on the consequences of changing age patterns over the government fiscal equilibrium.

Table 3 shows that the ratio between age-related tax revenues and age-related tax expenditures (TR/TE) was near to 1.0 in 2000. Expenditures, in absolute values, were allocated primarily to groups aged 50 or more, with extreme concentration among those aged 60 or more, the pattern for TE have no resemblance to the distribution of age-related tax revenues. Among the youngsters, a higher level of expenditure was allocated to the age group 10-19 than to the 0-9 years old (see Figure 7).

The 2025's scenario, however, is quite different. The TR/TE ratio (0.84) would be smaller than in the 2000 scenario (0.99). While between 2000 and 2025 age-related tax revenue would increase 33%, because of the high growth rate of the working age population, as said before, tax expenditures would increase even more (nearly 60%), because of the higher proportional growth of the older population. As a consequence, the age pattern of the government expenditures would vary drastically. Those aged 60 or more, would receive half of the government funding expenses. This is expected because of the advanced aging process (larger populations at older ages surviving for longer durations). The revenue age pattern would, however, remain fairly constant with the main contributors being the population aged 30 to 49.

Table 3
Brazil, 2000-2050: Simulation of government age-related revenues and age-related expenditures
(million US\$)

Age Group	2000		2025		2050	
	Age-related revenues	Age-related expenditures	Age-related revenues	Age-related expenditures	Age-related revenues	Age-related expenditures
0 – 9	8,904.2	13,521.2	8,328.02	12,646.3	7,178.9	10,901.2
10 -1 9	14,313.1	22,421.5	13,293.4	20,824.2	11,333.5	17,754.0
20 – 29	29,172.8	12,258.8	30,311.4	12,737.3	26,773.6	11,250.6
30 – 39	35,095.0	7,469.3	44,653.3	9,503.6	39,453.2	8,396.8
40 – 49	34,683.6	14,033.8	49,777.2	20,141.1	53,302.5	21,567.5
50 – 59	16,021.5	23,184.1	29,975.2	43,375.9	37,073.1	53,646.9
60 – 69	6,770.6	30,131.0	13,913.2	61,917.7	23,941.6	106,547.2
70 +	3,112.6	25,534.7	6,612.7	54,247.7	18,355.9	150,583.7
Total	148,074.0	148,554.5	196,864.5	235,393.6	217,412.3	380,648.0
% of age-related expenditures allocated to pop. 60 +	37.47		49.35		67.55	
TR/TE (*)	0.99		0.84		0.57	
Relative variation	2000-2025		2025-2050		2000-2050	
	Tax revenue	Tax expend.	Tax revenue	Tax expend.	Tax revenue	Tax expend.
	32.9%	58.5%	10.44%	61.71%	46.8%	156.2%
Annual Increment (%)	1.14	1.84	0.40	1.92	0.77	1.88

(*) Ratio of tax revenue to tax expenditure.

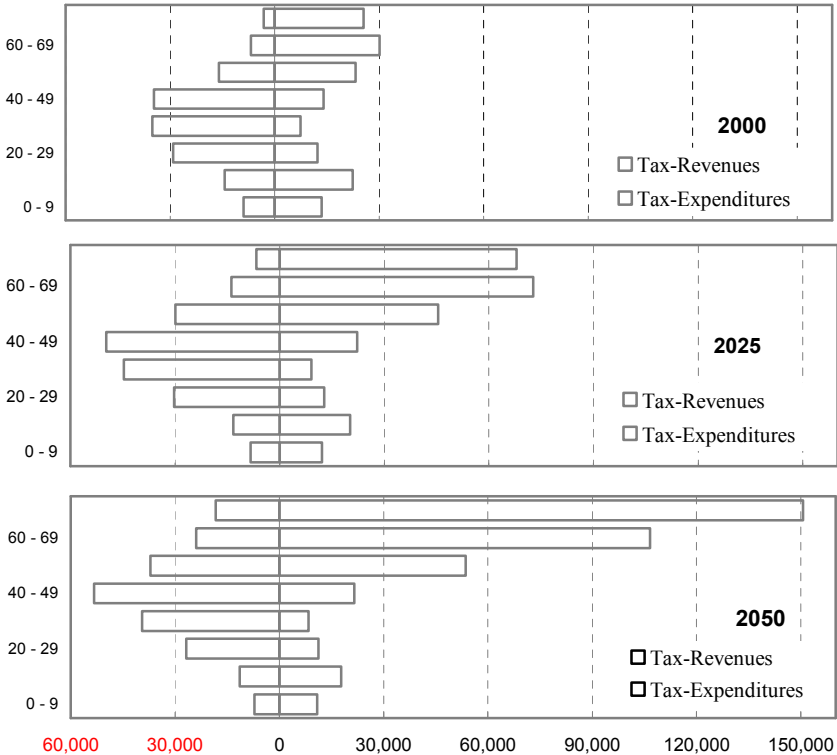
Source: Estimated from data produced by Turra (2001)

The 2050's scenario follows the trend initiated around 2025 according to this simulation. The TR/TE would have dropped nearly to 0.5. Between 2025 and 2050 tax revenues would increase only slightly (10%), since the working age population (the main tax-payers) would experience small growth rates.

The opposite would happen to the government age-related expenses which would grow by more than 60%, because of the rapid increase in the older population. Clearly, this would affect the public debt. Finally, while age patterns for tax revenues would remain about the same, the age pattern of public funding would exacerbate the trend described for the previous period. In absolute terms, fewer government financial resources would be allocated to the young people since it can be expected that this population will continue to have negative growth rates until the end of the first half of the century. Nearly 70% of the age-related tax expenditure would be allocated to the population aged 60 years or more.

In short, if current per capita government expenses and revenues by age are kept constant the difference between age-related government expenditures and revenues would experience a considerable expansion and cause an unbearable increment in the fiscal deficit.

Figure 7
 Brazil, 2000-2050: Government tax revenues and tax expenditure by age (million US\$)



Source: Table 3

3 - Age related social and economic policies

The AST creates different opportunities and challenges across age groups. This section considers the consequences of the age transition on the social demands of selected groups; also alternatives to sustainable development are discussed.

3.1 Childhood Population

The infant population, although presenting small oscillations that cause variations in the new cohorts' sizes has, basically, below zero growth rate. Thus childhood public policies would benefit much more the new generations which is a demographic favorable condition on the demand side. Complementarily, the current young population has a greater chance to receive better assistance at the family level for things such as health care and food, at least in view of their lower share vis-à-vis the adult population that supports them. Three aspects are considered here: Nutrition, Education and Health care.

Children's Nutrition

Conditions for improvements in nutritional standards came about during an AST. For instance, the decline of fertility in Brazil had as a consequence not only smaller family sizes but also wider birth intervals. These are typical of fertility decline consequences, and were present in Brazil (Bemfam, 1997), and thus the chance to improve levels of infant nutrition increased. The evidence confirms that these conditions improved during the eighties, when fertility decline were well established (Peliano, 1990). However, a society can only take advantage of a demographic bonus to allow it to solve or reduce social problems if the right planning is done at the right place and at the right time. Thus, there are still vulnerable populations at these ages. Silva et al. (2001), have found out high prevalence of anemia among children below 36 months of age in public day care centers in Porto Alegre/Brazil a city with relatively high living standards for the late nineties. Although there are no data for assessing nutritional status before the fertility decline, the finding indicates that intervention to overcome this problem is needed. Surely, this will be easier (or less difficult) with smaller cohorts.

Together with the demographic transition may come other factors that outpace the bonus. Modernization, for example, very often encourages Western nutritional habits. Brazil is now in a nutrition transitional stage experiencing increases in the prevalence of obesity and related chronic diseases: there are evidences of increasing preference for processed and junk foods regardless of socio-economic level for a variety of Brazilian population from big cities either in the North or Southeast Brazilian regions⁹. Doyle and Feldman (1997) point to the need to involve children and parents in nutrition education campaigns to improve dietary preferences and avoid the risk of chronic diseases. It is a quite obvious recommendation, but is far from being generally implemented. Another example is that, due to the Brazilian age pattern of fertility decline, there is a larger share of teenager pregnancies, and it is known that they are prone to deliver low birth weight babies. Socio-cultural factors such as poverty and social deprivation, as well as biological and nutritional factors during pregnancy may be important determinants of this (Gama et.al. (2001). Low-cost programs toward a young population may be planned for successful interventions now that they have around zero growth rates.

The school age population

Population below age 15 years, in general, will probably decline in size at least until 2050, although the various age subgroups implicated will experience oscillating growth rates. Obviously, as was the case for South and Southeast Asian countries, the declines provide a clear demographic opportunity to

⁹ See for instance: Doyle and Feldman, 1997; Aquino and Philippi, 2003; Barreto and Cyrillo, 2001.

achieve universal primary education with quality. To reach this objective a new educational model is needed with sufficient flexibility to allow planners to anticipate the oscillating population flows that will have to be attended.

Brazilian has an unusual and favorable opportunity to implement an educational policy to overcome shortcomings in the elementary school system, such as unsatisfactory coverage, very high grade repeat and drop outs rates, as well as the low wages and poor qualifications of teachers. The first basic goal of eliminating illiteracy is underway: the proportions illiterate among the population aged 10-14 halved during the nineties and is now around 4% according the 2000 census. Coverage also increased: school assistance for those aged 10-14 years reached 95% and for the young people aged between 15 and 19 years, the proportion reached 66% (Silva Leme and Wajnman, 2000).

The infrastructure for improving the coverage of primary education is available, although, it faces misallocation of both, human resources and physical premises . New arrangements are needed, on the one hand, in rural areas, where the onset of fertility decline came later, but it is there where –in addition to out-migration– the number of school-aged children is declining less drastically. On the other hand, re-organization is also needed because of the upsurge of new migration flows from big *metropoli* towards small and medium size cities. It is known that the educational infrastructure usually concentrates in the big agglomerates to such an extent that supply may exceed demand ¹⁰.

As the pressures for young children entering school lessens, or even disappears, those already enrolled benefit from the AST. Riani (2001) shows that decrease in the school-age cohort in the 1990s made possible increases in both coverage and quality as well as improvements in the efficiency of the educational system. As a consequence, the annual failure rates in the primary school, which are extremely high - particularly among the poor, a phenomenon that leads to high drop out rates - might, instead, be reduced. In this way, more financial resources will be spared and could go to elementary school itself and high school, which coverage, as seen before, is lower than that of elementary school.

Regarding financial support, section 2.2 showed, on the one hand, that if current per capita age-related expenditures are kept constant this might result in fewer resources, being allocated to education in the near future, due to the decline of school age population in relative and even in absolute terms. On the other hand, a forecast rapidly growing fiscal deficit caused by the difference between age-related government expenditures and revenues will provide a strong argument for not raising public expenditure in the educational system. However, Brazil's current AST represent an opportunity to overcome one of its major problems, a reason why a case should be made for expansion of education instead of reducing them due to decreasing demand. The demographic bonus will only result in a large supply of human capital if appropriate investments are made (Birdsall and Sinding, 1998)¹¹. A further problem in spite of advancements in coverage of Brazilian basic education is an enormous deficit in terms of the secondary and university education, let alone their quality.

¹⁰ It is not unusual among misinformed local politicians and community leaders to ascribe decreases in enrolment or the occurrence of under-used school capacity to a lack of planning or the absence of federal government support, instead of crediting it to reductions in the size of the school-aged population.

¹¹ Birdsall, N & S. Sinding. (1998). Report on Symposium on Population and Economic Development, November 2-6, Bellagio, Italy. (Mentioned by Navaneetham, 2001).

In addition, Brazilian economy could perform better if policies of technical training were further reinforced. According to Bowman (1987), where there is already at least some diversity in economic activity and organization - as is the Brazilian case - there is more room for progress in alternative schooling. It was not fortuitous but intended, that educational agreements involving the government and the industrial and technological sector were developed in countries that are now on the forefront of the economic challenges- as South Korea, China and Malaysia, for instance. Thus, continuous learning through the post-school years, but not necessarily at the University, must be of increasing importance as the 21st century enters. Brazil should mirror the East Asian countries' transition, where the young population, with high skills attained through technical education, contributed to the progress in those countries (Bowman, 1987: 88-89). The quality and levels of schooling attained were such, that a succession of smaller cohorts of youth did not pose problems for the quality of future labor forces.

Finally considering human resources for education, it is worth reminding the called 'perverse consequences' by Potter (1990) on the educational levels of rapid fertility declines in developed countries. The United States is a good example: Preston (1984) argues that the fast fertility changes experienced by that country contributed to a deterioration in children's welfare. Worse education results were attributed to downwards demand for teachers because of the declining school aged population.

"This shift led to a lower wages for teachers, which induced a disproportionate number of the better teachers to leave the field or to avoid it altogether" (Preston, 1984, p. 449).

If quantitative demand of human resources for education is stable, there is no doubt that quality should be addressed.

One word about pre-school: while social demands for this age group could in principle be better addressed given the current reduction in population size, simultaneously to the window of opportunity, Brazil undergoes its own development and modernization process that may offset the shrinkage of the new generations. A typical example is the demand for nurseries or day-care centers that may disproportionately increase due to increases in female labor force participation -either as a cause or consequence of the fertility decline- and the widespread of modern attitudes stimulating children to interact in places other than their private homes. (Rosenberg, 1995). Since those demands will have to be satisfied at any rate, huge investments to obtain skilled staff are needed; otherwise younger generations may be deprived of minimum social conditions for their welfare.

Health care services for the children

There has been, in general, less pressure from the demand side and more opportunities for improvement in maternal care since current cohorts are smaller¹². Registered births attended by skilled health personnel were around 80% in the nineties whereas the figure available for 2002 is around 95%. (FIBGE).

¹² The annual number of registered births dropped from 4.2 million to 3.8 between the biennia 1999/2000 and 2001/2002 respectively. (FIBGE).

The AST has contributed to eradicating infant preventable diseases. As the fertility decline has evolved, total coverage of preventive care for some important infectious diseases due to low cost vaccination has been reached. (DATASUS 2002). Measles and hepatitis-B did not reach 100% coverage in the public vaccination campaigns, only because these services are provided also by the private sector in wealthier areas.

Child-oriented prevention programs are expected to undergo a further growth following modernization and diffusion. In that sense, diffusing education through mass media will expand demands for preventing illness instead of curing them. Consequently it will be necessary to re-address and improve skills relating to health prevention. Physical activity, drug consumption and sexual behavior, together with nutrition, previously mentioned are important examples of issues to be addressed in view of the new demographic pattern.

3.2 The working age population

During an AST in countries where the labor force is still an important component of the productive system, it is the working age population which plays the most important role. On a priority basis, they should be given every opportunity to become skilled. The Brazilian AST at working ages involves, as said, a positive r for the most part of the 2000 – 2050 period and it has an important and increasing share of the total population over the next 25 years approximately until. Thus the first and most obvious challenge is the generation of new employment to catch up with the growth of the working age population. Inside this large age group, however, the junior segment, i.e., population aged 15-24, is already entering a period of negative growth, while the mature labor force is increasing. From a demographic point of view, this composition represents a bonus if the labor force is productively employed. The positive growth of the mature labor force would lead to higher savings, higher government tax-revenues and consequently higher capacity for funding social programs.

In Brazil, an important part of the young working age population is still at school but some are also in employment. At ages 15-19, two thirds attend school with or without job; only one third, very often the poorest, are full time workers. Silva Leme and Wajnman (2000) found out that among those simultaneously employed and attending school a significant portion re-entered school after becoming economically active. This may be the signal for pressure for further training to attain better productivity. Thus, again, policy makers could take advantage of the AST and focus on human resources in general, and on the younger generation in particular.

There are additional reasons to focus on junior working age population. On the one hand, the intra-working age ratio, that indicates less pressure on the economy for the generation of new jobs in the near future, can be interpreted as an indicator of another window of opportunity. On the other hand, this situation might also pose a threat. Chesnais (2004) argues that this group is also a proxy for new consumption demands as they are at the stage of family formation when demands on new households rise as do purchases of furniture, cars, and similar goods. At the same time, the negative growth rate of this group might negatively affect the economy if their consumption demands are not increasing.

Another specificity of the mature working age population is their increasing share in the total population and their association with economic growth because of their high rates of saving –more accentuated among those aged 50 or more (Lindh & Malmberg, 1999); as mentioned before, their r

would be high and almost constant over the next few decades. As in the case of Singapore analyzed by Navaneetham (2001), Brazil can use the demographic bonus of larger population size at age group 50-64 during the period 2005-2045 to increase saving rates and exploit this opportunity for economic growth. In this particular case, it must be said, the demographic bonus is a mere accessory. Benefits will only materialize, if policies encouraging savings are implemented, and, on top of this, full employment is achieved and equilibrated national budgets are established. This is, clearly a huge challenge for the Brazilian policy makers. Behrman et al. (2001), explain that in Latin America, the aging process did not match increases in savings in contrast with what happened in Asian countries undergoing similar AST. One reason for this, they said, is that “right when the region was provided with the demographic boost, it was hit by the negative shock of the debt crisis”.

Obviously, as the elderly dependency ratio is increasing sharply, echoing what Navaneetham has reported, it is important to take advantage of the demographic bonus provided by the working age composition, to be seen from now till at least, 2045. This could increase saving rates to meet future old age burdens.

3.3 The elderly population

The size and share of the age group 65 or more, it has been said, will continually increase throughout the AST. Thus the Brazilian population aged 60 years or more will pass from 8,9 millions in 2000 to 50 millions in 2050. By then, their share would represent 20% of the total population, a proportion higher than current percentages in any European country¹³. Thus, by 2050, Brazil will probably be faced with the complex situation of catering for an aged society, older than that of today’s Europe, where a much slower aging process with concomitant social and economic development has not been produced a society for all ages. The challenge in Brazil and Latin America is to know whether in a shorter period, the Region – that has a noticeably unfair distribution of both incomes and social services- will be able to meet this challenge. In the absence of permanent and coherent public policies embedded in sound social and economic planning, there is the threat of increasing inequality. In formulating policies to meet this challenge, the AST should be not only be taken into account but should play a fundamental role. Behrmen et al. (2001) show, particularly for Latin America, that, when the share of older population (and more unequal) age groups increases, inequalities tend to rise.

The challenge placed by the AST to the elderly population is to provide resources and social infrastructure to allow them an active aging, which in terms of policy programs should have three foundations: social security, health and participation (PAHO, 2002) that are discussed below. Simulations predicting government expenditures make it clear that, without structural changes, there will be a serious risk of not satisfying demands implicit in implementing programs of active aging. The changes will not be reached through the solely market forces.

Social Security

Social security in Brazil, as in most Latin American countries is, a pay-as-you-go system that worked out relatively well in a relatively young, quasi-stable population, but that now faces, chronic, structural

¹³ The highest proportion for the population aged 65 or more in Europe, is to Italy (18.1%) for the quinquennium 2000/2005. (United Nations, 2003)

non-demographic crises. Increases in longevity associated to its particular AST will aggravate financial disequilibria in the Brazilian system if the retirement age does not change. As is shown in the simulations above, transfers towards older populations will consume half of the total age-related government revenues by 2025, or about two thirds by 2050; this, of course, is on the further assumption that resources are available. The complex Brazilian social security system is one of the few where a minimum age for retirement is not universally imposed. On the one hand, after at least 78 monthly continuous contributions, one can apply for retirement at the age of 60 (women) or 65 (men). On the other hand, according to more recent changes, most of the workers in the private sector are entitled to retire after 30 years (women) or 35 years (men) of contribution to social security, regardless of their age.

One structural alternative to ameliorate the coming scenario is the raising of the average age for retirement¹⁴. Recent reforms introduced into the Brazilian Social Security System have changed the legislation relating to civil servants, requiring from new entrants a minimum age for retirement of 55 (women) and 60 (men). The rising deficits of the system will probably force the introduction of similar age constraints for workers of the private sector. Strategies like holding pension benefits constant in real terms, rather than linking them to real wage variations or reducing benefits in response to increased longevity, may be adopted. This is very often a recommendation of international creditor agencies; it may ease the pension burden, although living conditions will probably deteriorate.

Incentives for staying longer in the labor force may ease the fiscal burden. Continuing to work can imply individual costs in terms of contributions paid and foregone pensions or other benefits, while it may result in permanently higher pensions after retirement; this alternative has been included in the recent proposal of changes of the Brazilian Social Security legislation. In contrast, the discouragement of early retirement would raise the labor supply of older workers, and it might be difficult to absorb this increase if there are high levels of structural unemployment, including among mature members of the labor force (see earlier), which, again, may well be the Brazilian case. Thus, again, it seems that an increase in the employment growth rate is the way to capitalize on the demographic bonus coming from the AST.

Besides, entry to the labor market after retirement is already a fact in Brazil since about one third of retirees economically active (Liberato, 2003). This happens, in part, due to the rather early age at retirement (56.5 years on average, Figoli, 2000); but mainly because despite the 'generous social security program', benefits are unequally distributed and monthly payment among significant proportions of retirees receive only the minimum wage (around US\$85 in 2003) and thus they return to the labor force for economic reasons. According to Schwarzer and Querino (2002), 43% of older people in the labor force are classified as "poor". Furthermore, in important urban agglomerations like Sao Paulo, nearly 80% of retirees or pensioners that re-enter the labor force, report economic needs as the main reason for doing so. This is a common finding also for other Latin American cities (SABE/PAHO, 2000).

Health care assistance to the older population

¹⁴ The OECD has published several studies recommending this alternative in developed countries (See for example, OECD, 1998). See also, Heller, 2003.

It is known that the health care needs of older populations are quite different from those of the rest of the society because of the high incidence of chronic and degenerative diseases, and disability that require huge expenses in equipment, medicine, and skilled human resources. Given weaknesses in the public health system in Brazil, the rapid aging process points out the need to redefine this sector's policy in order to prevent, or at least attenuate, destitution among the older generations.

An example of the magnitude of increasing costs in health care due to the aging of the population is given by the number of older people with chronic conditions i. e., those in permanent need of health care. It is estimated that about 75-80% of the urban population aged 60 or more in Latin America have at least one chronic condition (SABE/PAHO/2000). A conservative estimate for Brazil, applying this proportion, gives a current figure of 11 millions persons aged 60 or more having at least one chronic condition. This would rise to 27 million in 2025 and to nearly 50 million by 2050. A similar extrapolation exercise considering disability, i.e., those in need of support, results in at least 2.7 million older people nowadays with one limitation in terms of daily life activities (6.7 in 2025 and 12 million in 2050).

How, then, to deal with the challenges in face of the obvious threat of insufficient economic resources? Besides the obvious need to allocate resources for the health care of elderly people, some of the possibilities lie in the implementation of specific health care programs, some others in the social networks of elderly people.

In relation to public health, it is known that, in general, health care services are oriented to child, maternal and reproductive matters and to dealing with infectious diseases. As the epidemiologic transitions has progressed in Brazil, that approach is changing now for the country needs to be reassured that emergent health care needs will be met. As in the case of children, public health needs to address prevention policies, focusing, for instance, on chronic disease that very often when access to medical treatment is difficult, lead to disability. The goal, according to PAHO (2002), should be to provide adequate training for health care workers, appropriate and necessary health care for older persons and primary health care oriented to elderly people.

Participation - Social networks and intergenerational support

The increase of longevity and therefore an increasing prevalence of disabilities in population that is becoming "older" quickly, together with deficiencies in the health care system, mean that the best alternatives for support are the social networks available to elderly people. There is wide evidence that a strong social network will contribute to the better welfare of elderly people¹⁵. In the city of Sao Paulo, the SABE Survey shows that 60% of elderly people with at least one disability receive support from close relatives (partner, child or in-law), who comprise the 'informal' networks that can give support. The same survey documents Sao Paulo as being among the cities with higher levels of interaction between older adults and the community (Peláez and Wong, 2004). There are also indications that intergenerational support works in the opposite direction: the family, very often takes advantage of the elderly's retirement or pension payments, particularly in the rural area. Camarano (2002) finds out that pensions and retirement payments explain the association between the elderly contribution to the household budgets and living arrangements. This is a mechanism by which to

¹⁵ Cohen S. (2001), makes an inventory of international studies related to networks.

promote integration of the family which may –or may not– favor the overall living conditions of elderly persons.

In short, policy makers should take into account this low-cost resource, and stimulate and support their formation. The networks should include above all family and close relatives who will probably become the care-givers of potential disabled elderly persons. Encouraging the development of social network, is one way of facilitating both health care and opportunities for better conditions of living among elderly people.

4. Some Concluding Remarks

The demographic change that causes the current Age Structural Transition in Brazil is just an example of an almost generalized process underway in Latin America. No matter which mechanisms determined the AST, the windows of opportunity have provided favorable conditions for the society to re-formulate social policies regarding education and health for the children, for instance. Of course, it would be naïve to believe that a decrease in the number of births, whether in relative or even absolute terms, and a reduction in the total population growth rate as a consequence of fertility declines will result in the automatic solution of social problems (Carvalho and Wong, 1998). The Brazilian society need to be pro-active to take advantage (or not) of the various opportunities brought about by the fertility transition. Favorable conditions raised by the new population dynamics should be effectively taken into account in the implementation of social policies. A definition of priorities, based on the new demographic patterns in which the allocation of resources in sectors guaranteeing higher social yields in the medium and long term, is an urgent need. The bonus is only available on the demographic side of the population and development equation; and much of it may already have been wasted because appropriate policies were not in place.

Another opportunity brought about by the AST will unfold during the first two decades of this century: it is the positive growth rate of the working age population, and above all, of the mature working age while there are negative growth rates for the junior working population entering. Several advantages of this situation have been pointed out. This bonus however, can only be exploited if full employment and higher productivity are pursued. Otherwise, it will instead result in a potential threat to economic and social stability.

As a necessary although not sufficient condition by which to achieve social, economic and intergenerational balances, labor force skills should be enhanced. For this reason, opportunities to become skilled should be made a priority for workers-to-be. This would be a most effective way in which to better social conditions. Society should be always conscious that today's workers will be the ones who will have to support the rapidly growing old population in the future.

Prospectively, any exercise simulating government expenditure in the future, will produce what are already well-known scenarios: older age groups will demand massive resources over the medium- and long-term, either because of the social security system, or because it is at older ages that health care becomes more necessary and more costly. The forecast fiscal crises due to the aging of the population, combined with the unsoundness of the Brazilian Social Security System is a matter of daily discussion, mainly through the media, not only among government authorities, but also among other well-informed sector-groups, such trade unionists, entrepreneurs and academics. Structural changes have

been proposed and some degree of relief is expected, in spite of the strong opposition of some sectors and groups that try to maintain interests and privileges guaranteed by the current system.

Most of the policy recommendations discussed here regarding the factors impacted on by ASTs are similar to those made to developed countries decades ago. Their experiences, therefore, should be considered, taking into account, above all, the striking difference in the speed of the current population changes¹⁶. In order to take advantage of demographic bonuses and to prepare the society for the emerging challenges, it is extremely important to be aware of the short period available to implement and accomplish plans and policies, whatever they may be. The window of opportunities has an extremely short duration, yet, it will be meaningless if reforms in policies for elder people do not succeed and, of equal importance, if funding programs directed to younger population are neglected.

Finally, to take advantage of any demographic bonus, the whole society needs to be involved. In this era of globalization, clearly, the whole society is not limited to national frontiers. Full employment, decent social welfare and adequate technological health care resources cannot be achieved by any one country alone. Both the North and South hemispheres are ‘the society’ and both are exposed to the (positive and negative) consequences of the Age Structural Transitions.

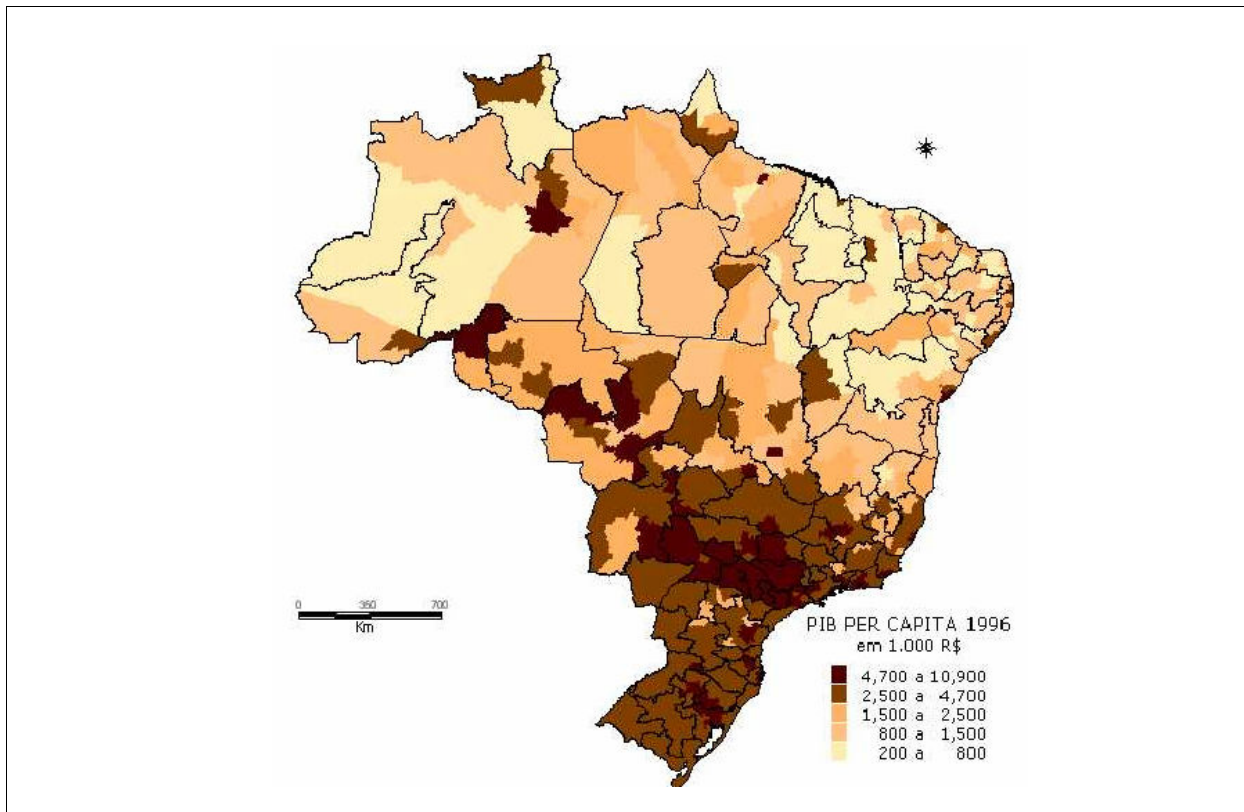
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¹⁶ See for instance: Ogawa et al., United Nations/ESCAP (1983).

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Annex 1 - Brazil, 1996: Economic density according to GNP strata – Annual Estimates



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